

RC

U/R

Work Order ID 74667



Page 1

Wednesday, October 05, 2011 8:25:14 AM

Item ID: D350-748-101

Accept



Setup Start



Revision ID: U/R

Stop



Item Name: Crosstube Installation, High Fwd

Start Date: 10/5/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 10/21/2011 Req'd Qty: 1.00

Customer:

Reference:

Run Start



Approvals:

Process Plan: M.L.J.

Date: 11/10/04 Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr

Revision Nbr

D350-748-141

[F U/R] OK 11/10/05

100

0.00



DOCUMENT CONTROL

DC:

Memo

0.00

Document Control

Photocopy bluefile & type labels per PPPD350-748-101

CHG002

S 12/01/02

110

0.00



BENDING MACHINE - CROSSTUBES

CNC Bend-1

Memo

0.00

CNC Delta 100 Bender

Bend tube as per Dwg D350-748-141 using CNC bender program D350F and Folio FT

DP

11-11-9

120

0.00



QC15- Crosstube Dimensional Check

QC

Memo

0.00

Quality Control

S 11/10/05

④

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

125

0.00



HandFXtube

Memo

0.00

Hand Finishing Crosstubes

Stress relief

Heat treat crosstube as per QSI010 4.3

Temp: 375

Start time: 4h45

Finish time: 8h45

SAD 11-11-09

127

QC6- Inspect dimensions to drawing

0.00



QC

Memo

0.00

Quality Control

8/11/10



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QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

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--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

130

0.00



Crosstubes

Crosstubes

Memo

0.00

1-Drill Tube as per Dwg D350-748-141 Using DT8876 A,B & C Drill Jigs,
Set-up drill table as per QSI 010

2-Deburr

3-Engrave Part # and Batch # as per Dwg D350-748-141

4-Remove all marks from tube within limits of D350-748-141

5- Apply a light coat of LPS3 on the interior of tube

Batch: 109956

BT
11-11-10
MO 11-11-14

140

0.00



QC

Quality Control

QC5- Inspect part completeness to step on W/O

Memo

0.00

CHECK 10 DEG HOLES WITH DT8876E (EUROCOPTER CLAMP)

Sulu

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QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

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150 Outsource process-Cadplate per QSI017 4.1.9.1 0.00



Outsource3

Outsource process - Cad plate

Memo

Issue P/O: 15462
Stress relief at 375° for 5 hours
Magnetic Particle Inspect per ASTM E1444
Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2
Embrittle relief at 375° for 8 hours, Chromate Treat
Possibe Supplier: Southwest United Industries
Ensure Certificate of Conformity is attached

160 Receive & Inspect for Damage & Mat'l Certs 0.00



Packaging

Packaging

Memo

Ensure certificate of conformity is attached

170 QC5- Inspect part completeness to step on W/O 0.00



QC

Quality Control

Memo

issue P/O: 15634 to acmen w/DT

rec'd 10/12/11

★ SEE W/O LAB ATTACHED

POSITIVE RECALL

EFFECTIVE 11/10/05 AUTH JP

RELEASED 12/10/05 DATE 12/11/11

CL 11/12/08

11/12/11

11/20/11 - see attached Helitrades

(P/O)

Dart Aerospace Ltd

W/O: 74807		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: D350-748-101 PAR #: _____ Fault Category: X-tube NCR: Yes No DQA: dit Date: 11/12/07
 11-1098 Resolution: Re-work Disposition: Re-work QA: N/C Closed: dit Date: 12/4/23

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
11-11-07	140	2 indications found on right side on inside of tube	CP 11/12/07 05/042	re grind affected area + re NDT area if passes re cap plate in affix area	RC 11-11-07 P/O 15059	S 11/12/07	CP 11/12/07 05/042	RC 11/12/07

NOTE: Date & initial all entries

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Page 6

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Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Stop



QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
210 QC Quality Control	QC5- Inspect part completeness to step on W/O Memo	0.00 0.00							
220 Packaging Packaging	Pick Kit Memo	0.00 0.00							
230 QC Quality Control	QC4- 100% Inspect kits for completeness Memo	0.00 0.00							

8/11/21

8/11/21 (1)

8/12/102

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Page 7

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Required Date: 10/21/2011 Req'd Qty: 1.00



Customer:

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Run Start



Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Stop



QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
240		0.00							
	Packaging								
Packaging	Memo	0.00							
Packaging	Identify and pack for shipping as per PPP D350-748-101								
	Location: <u>102</u>								
	PPP Rev: <u>C</u>								
250		0.00							
	QC21 - Final Inspection - Work Order Release								
QC	Memo	0.00							
Quality Control									

M.L.S 12/01/03
(1)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Parent Item Name: Crosstube Installation, High Fwd







Start Date: 10/5/2011

Required Date: 10/21/2011

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A New Issue 06-07-05 JLM
 IPP Rev:B Update qty of MS21042L5 06-09-12 KJ
 IPP Rev:C Rev B 07-11-15 DD
 IPP Rev D Combined manufacturing 08.04.02 EC verified by: DD
 IPP Rev:E 08-06-24 revD as per dwg DD verified by:EC IPP Rev:F
 10.08.04 added QSI010 4.3 DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D350-748-141TRN  Crosstube Turning Detail		Manufactured	No			110	Each	3.0000	1	1			
						B73574			SAD 11-11-09				
						<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>					
						LG	3						
						72812	1						
						72815	1						
						72817	1						
ALS4-1032-225  Insert		Purchased	No			200	Each	1,852.000	1	1			
									BT 11-12-20				
						<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>					
						ST282	1852						
						110768	62						
						118386	860						
						118966	930		XL				
AN960JD10  Washer	NAS1149D0363J	Purchased	No			200	Each	0.0000	1	1			
						119537			BT 11-12-20				

W/O:		WORK ORDER CHANGES					
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Parent Item Name: Crosstube Installation, High Fwd

Start Date: 10/5/2011

Required Date: 10/21/2011

Start Qty: 1.00

Required Qty: 1.00

D2856-400 Manufactured No

200 f

373.3845

1.181

1.243158



Abraison Strip



BT 11-12-20

Location

Loc Qty

Loc Code

ST403

0.3149

68076

0.3149

ST409

373.0696

63735

0.6696

71164

156.4

73491

216

200 Each

63.0000

2

2

D3502-1

Manufactured No



Support



BT 11-12-20

Location

Loc Qty

Loc Code

ST063

63

61206

7

64004

10

68951

12

72129

14

73419

20

200 Each

62.0000

2

2

MS21920-20

Purchased No



Clamp (per MIL-DTL-8783C)



BT 11-12-20

Location

Loc Qty

Loc Code

LG050

62

116799

10

118236

6

118649

46

x2

W/O:		WORK ORDER CHANGES					
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Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Start Date: 10/5/2011

Required Date: 10/21/2011

Start Qty: 1.00

Required Qty: 1.00

MS27039-1-10

Purchased

No

200

Each

215.0000

1

1



Screw

119531



RT 11-12-20

Location

Loc Qty

Loc Code

ST290

15

117441

15

ST291

200

118612

200

220

Each

309.0000

8

8

AN4-41A

Purchased

No



Bolt

Location

Loc Qty

Loc Code

ST360

309

115108

34

115705

50

116191

50

117619

50

117795

25

118451

50

118838

50

117795

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Start Date: 10/5/2011

Required Date: 10/21/2011

Start Qty: 1.00

Required Qty: 1.00

AN4-6A

Purchased

No

220

Each

6,236.000

16

16



Bolt

Location

Loc Qty

Loc Code

ST356

1230

117872

30

118422

300

118628

400

118838

300

119127

200

ST358

6

117514

6

ST516

5000

119017

5000

220

Each

183.0000

4

4

AN5-32A

Purchased

No



Bolt

Location

Loc Qty

Loc Code

ST339

75

118628

50

118983

25

ST340

108

117872

58

118422

50

220

Each

0.0000

32

32

AN960JD416

NAS1149D0463J

Purchased

No



Washer

AN960JD516

NAS1149D0563J

Purchased

No



Washer

220

Each

0.0000

8

8

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Start Date: 10/5/2011

Required Date: 10/21/2011

Start Qty: 1.00

Required Qty: 1.00

D3500-1
Saddle

Manufactured No

220 Each

28.0000



4

370000

12/1/2011

Location

Loc Qty

Loc Code

ST424

21

66127

9

68947

12

ST424/25

7

62207

7

D3501-1
Bushing

Manufactured No

220 Each

245.0000



16

16

73391

12/1/2011

Location

Loc Qty

Loc Code

ST063

202

68939

102

70682

100

ST066

43

67757

43

MS21042L4
Nut

Purchased No

220 Each

14,709.00



24

24

12/1/2011

Location

Loc Qty

Loc Code

ST300

3709

117441

51

117601

637

117885

21

118451

2000

118927

1000

ST516

6000

119017

6000

ST518

5000

119075

5000

119017

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Required Date: 10/21/2011

Start Qty: 1.00

Required Qty: 1.00

MS21042L5

Purchased

No

220

Each

2,684.000

4

4



Nut



Signature

Location

Loc Qty

Loc Code

ST300

1184

116105

5

116548

53

117441

248

117611

82

118179

496

118910

300

118910

ST518

1500

119109

1500

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

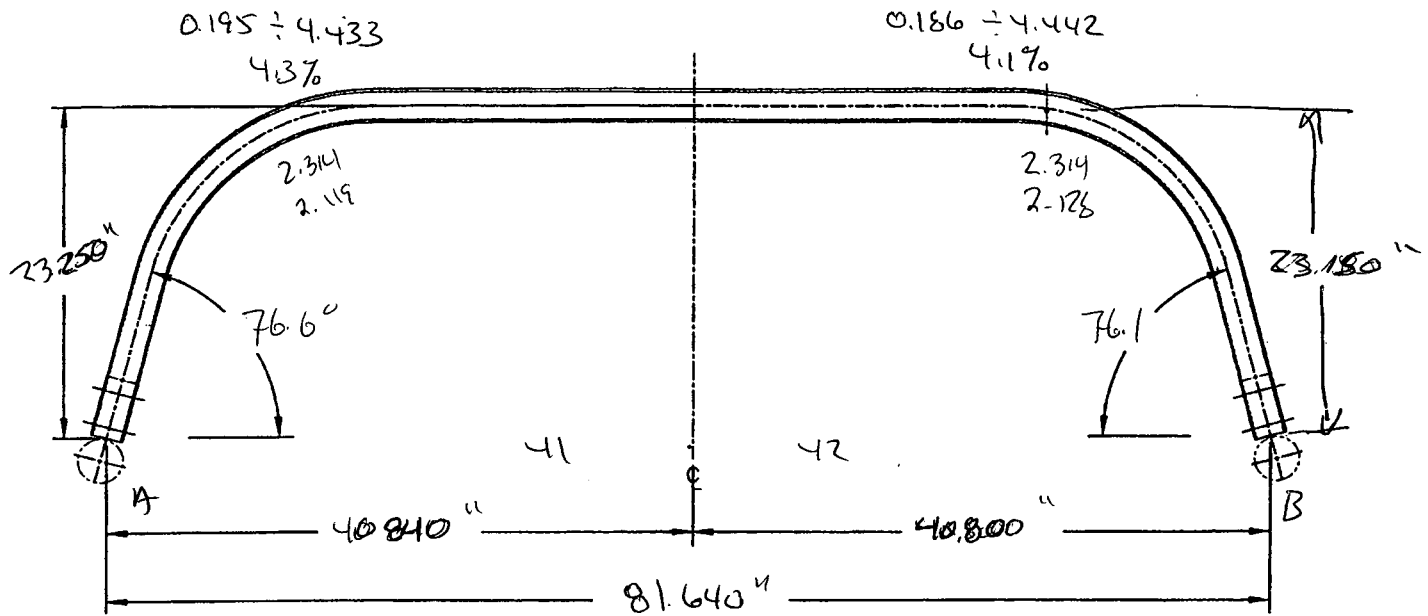
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DART AEROSPACE LTD		Work Order:	74667
Description: Crosstube High Fwd (AS350/355)		Part Number:	D350-748-101
Inspection Dwg: D350-748-141 Rev: E		Page 1 of 1	

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04



Comments
0.116 twist
Side A - 4.3% crush @ 41 power
Side B - 4.17% crush @ 42 power

QC15 Inspection	0
Date	11/11/10

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

11/11/10

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Item	Qty -141	Part Number	Description
1	X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
2	1	D6015-125	CROSSTUBE (OR D6017-115)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6017-115
FINISHED LENGTH = 110.270±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER "D350-748-141" AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 30.45 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 74667 M.L.J

OK 11/10/05
UNDER REVIEW
11/10/05

RELEASED
2011-01-18

F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT ADD STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); TOLERANCES (ZN C6-3, D1-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6017-115 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN	<i>qp</i>	DART AEROSPACE LTD	
DRAWN	<i>qp</i>	HAWKESBURY, ONTARIO, CANADA	
CHECKED	<i>BE</i>	DRAWING NO.	REV. F
MFG. APPR.	<i>BE</i>	D350-748-141	SHEET 1 OF 4
APPROVED	<i>HA</i>	TITLE	SCALE
DE APPR.	<i>HA</i>	CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE:	10.11.23	COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL, AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

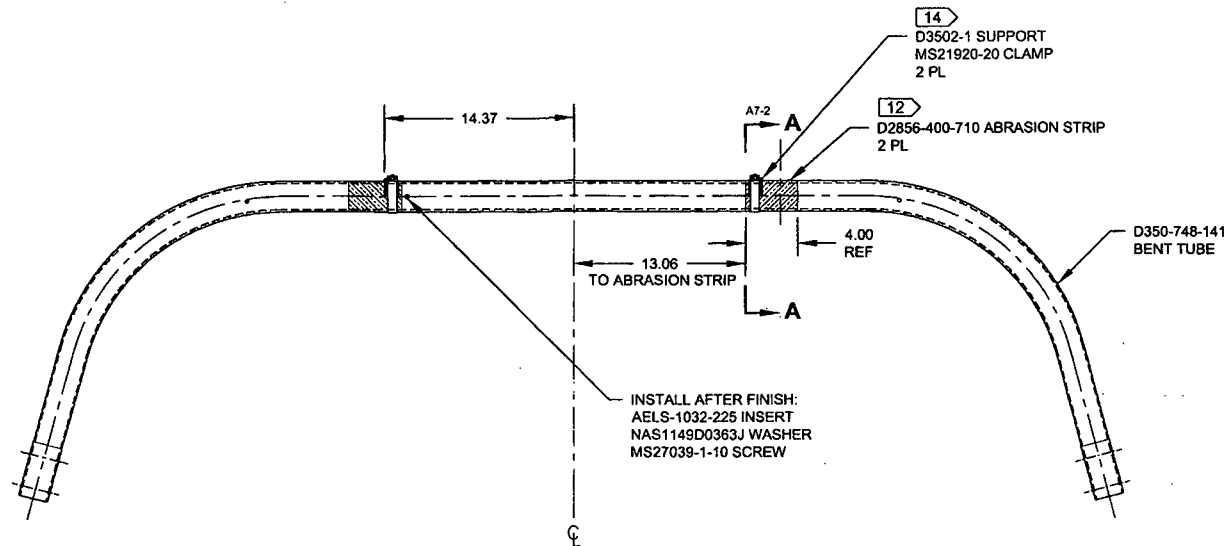
Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

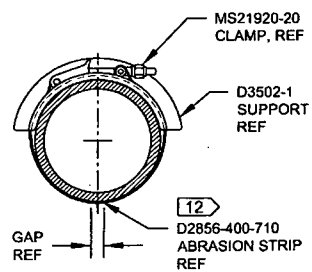
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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

74667



**D350-748-141
ASSEMBLY DETAIL**



SECTION A-A D4-2
SCALE 4X

UNDER REVIEW

CP 11.07.11

RELEASED
2011-01-08

DESIGN	92	DART AEROSPACE LTD	
DRAWN	92	HAWKESBURY, ONTARIO, CANADA	
CHECKED	92	DRAWING NO.	REV. F
MFG. APPR.	FE	D350-748-141	SHEET 2 OF 4
APPROVED	92	TITLE	SCALE
DE APPR.	92	CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23	<small>COPYRIGHT © 2008 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

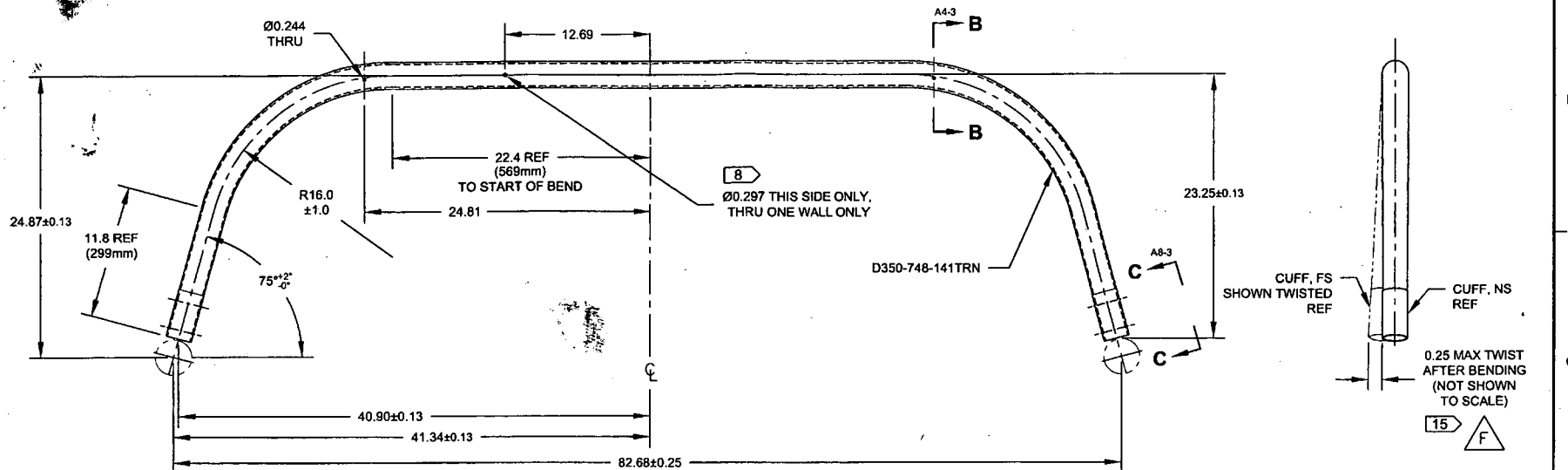
Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

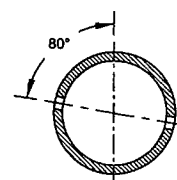
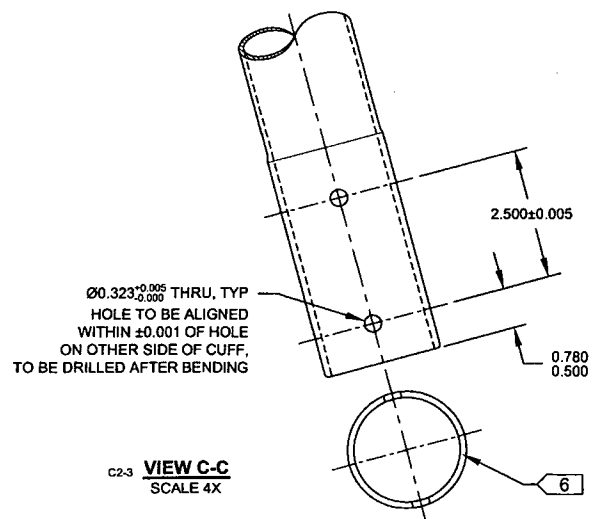
NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

74667



D350-748-141
BENDING AND DRILLING DETAIL 10



UNDER REVIEW

RELEASED
2011-01-18

DESIGN	AP	DART AEROSPACE LTD	
DRAWN	AP	HAWKESBURY, ONTARIO, CANADA	
CHECKED	B	DRAWING NO.	REV. F
MFG. APPR.	C	D350-748-141	SHEET 3 OF 4
APPROVED	H	TITLE	SCALE
DE APPR.	H	CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23	<small>COPYRIGHT © 2006 BY DART AEROSPACE LTD. THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

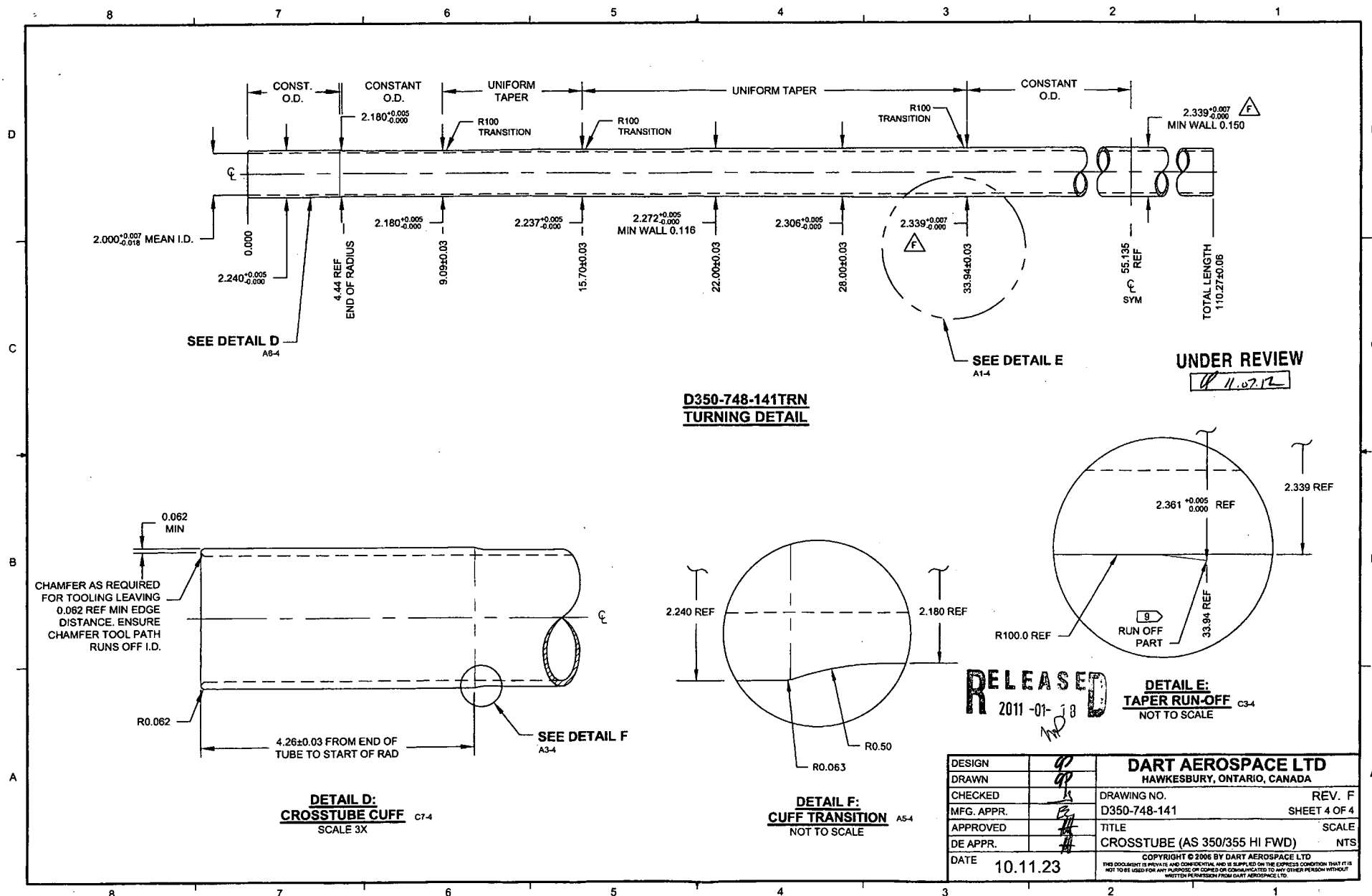
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Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

74667



W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
11.10.05	161	LOAD TUBE TO 3500 ^{lb} For 1 minute. REF D.S. EMBIL.				GP 11.10.05 DS1042	
11.10.05	162	NDT TUBE.				GP 11.10.05 DS1042	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Kim Johnston

From: Chris Provencal <cprovencal@dartaero.com>
Sent: Wednesday, October 05, 2011 10:07 AM
To: Johnston, Kim
Subject: FW: 350 crosstubes

Can you print this.

From: David Shepherd [mailto:dshepherd@dartaero.com]
Sent: Tuesday, April 27, 2010 3:40 PM
To: 'Mike Petsche'
Cc: 'Bill Beckett'; 'L Lacelle'; 'Chris Provencal'; 'Dan Stow'; ssheldon@dartaero.com
Subject: 350 crosstubes

Mike,

I discussed the 350 crosstube load testing with Bill a little while ago and this plan makes sense to him.

So, my recommendation to clear these crosstubes is to load the fwd crosstubes to 3500 lb and the aft crosstubes to 3000 lb in the deflection test rig and document on the work orders that this test has been completed. Hold max load for 1 minute. Per TP-D350-748-2, these loads represent the maximum load on these crosstubes at gross weight and are below the yield point of the material. I would like to request that Chris Provencal witness these tests and sign off the work orders based on his experience with Dart landing gears. My feeling is that if there is a problem with the parts, it will manifest itself during this load test. I, for one, would feel a lot more confident in testing each crosstube in this manner than relying totally on what Exova has to say. I think it would be very difficult to reach a conclusion on the whole batch on the basis of cracks in two parts from the batch.

I believe that we can accomplish this before next Friday, which also gives us time to hear what Exova has to say in case it has an impact on our decision. So far, what I have seen from Exova shows me that there are fluctuations in the heat treating but the tubes are heat treated to our specification.

For this reason, I believe we should tell DHS that it looks like we will be able to start shipping 350 crosstubes by May 7th pending a successful Engineering test of the material.

David.

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

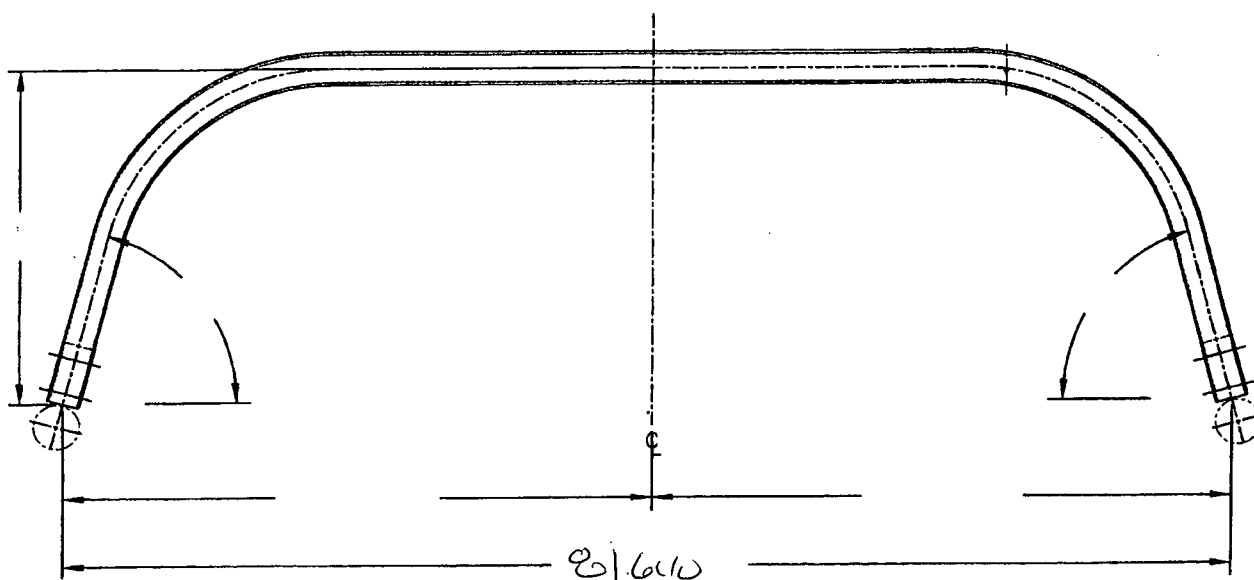
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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	
Description: Crosstube High Fwd (AS350/355)	Part Number:	D350-748-101
Inspection Dwg: D350-748-141 Rev: F		Page 1 of 1

For Stress Relief only

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04



Comments
<i>twist = 0.116"</i>

QC15 Inspection	<i>S</i>
Date	<i>11/11/06</i>

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	
C	11.11.07	Dwg Rev updated	KJ	<i>[Signature]</i>

**CERTIFICATE OF
CONFORMANCE**

**CADORATH PLATING CO. LTD.
2150 LOGAN AVENUE
WINNIPEG, MANITOBA R2J-0J1**

DATE: Nov-25-2011

CONIGNED TO: Dart Aerospace Ltd.
1270 Aberdeen St.
Hawksbury, ON K6A 1K7

W/O #: 109690

INVOICE #: 57840

**CONTRACT OR
PURCHASE ORDER #** 15462

DESCRIPTION: SKID

QTY 1

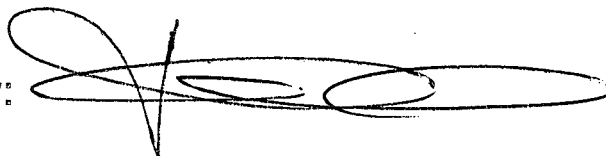
P/N # d350-748-101

S/N # B74667

STRESS RELIEVE BAKE HEAT CHART #11-1209. MPI IAW ASTM-E-1444. CADMIUM PLATE IAW AMS-QQ-P-416C TYPE 2 YELLOW CLASS 2. BAKE HEAT CHART # 11-1236. STRESS RELIEVE BAKE HEAT CHART #11-1209. MPI IAW ASTM-E-1444. CADMIUM PLATE IAW AMS-QQ-P-416C TYPE 2 YELLOW CLASS 2. BAKE HEAT CHART # 11-1236.

CERTIFICATE: I certify that the items indicated here on have been inspected and tested and conform to all specifications and requirements detailed on the contract or purchase order.

Approved Inspector:





LIQUID PENETRANT TEST REPORT

P- 12242

PAGE 1 OF 1

CLIENT	DART Aerospace	DATE	Dec 7, 2011	TIME	AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>
ATTENTION	LINDA	ACUREN JOB No.	188-11-02400		
ADDRESS	1270 ABENDEEN ST HAWAII, O.H.	PO/NO No.	-		
PROJECT	F.P.I. O.N	WORK LOCATION	SAME		
ITEM(S) EXAMINED	A WET FLUORESCENT LIQUID PENETRANT INSPECTION WAS CARRIED OUT 100% EXTERNAL				
JOB DESCRIPTION	PROCEDURE No. LT-012 REV./DATE 2008	TECHNIQUE No. LT-012 REV./DATE 2008			
PART No.	SEE RESULTS	MATERIAL	ALUMINUM THICKNESS VARIOUS + STEEL		
SCOPE	10 CROSS TUBES, 2 ENGINE MOUNTS				

TEST DETAILS

METHOD	<input checked="" type="checkbox"/> FLUORESCENT	<input type="checkbox"/> VISIBLE	<input checked="" type="checkbox"/> WATER WASH	<input type="checkbox"/> SOLVENT REMOVABLE	<input type="checkbox"/> POST EMULSIFIED
FAMILY BRAND	MAGNAFLUX		BLACK LIGHT S/N 16959	<input type="checkbox"/> OUTPUT > 1000 μ W/CM ²	<input type="checkbox"/> AMBIENT < 2 fc
PENETRANT	2-62	MINIMUM DWELL TIME 4510	MIN.	LIGHTING EQUIP. <input type="checkbox"/> FLASHLIGHT <input type="checkbox"/> TROUBLELIGHT	<input type="checkbox"/> OUTPUT > 100 fc @ SURFACE
PENETRANT REMOVER	HFO	MINIMUM DRY TIME >10	MIN.	OTHER LABING	
DEVELOPER	SKD 52	MINIMUM DWELL TIME 10	MIN.	LIGHT METER S/N 1098866	CAL DUE DATE FEB 12 2012
DEVELOPER TYPE	<input checked="" type="checkbox"/> NON AQUEOUS	<input type="checkbox"/> AQUEOUS	<input type="checkbox"/> DRY		

TEST SURFACE

SURFACE CONDITION	<input type="checkbox"/> AS GROUND	<input type="checkbox"/> AS WELDED	<input checked="" type="checkbox"/> MACHINED	<input type="checkbox"/> SHOT BLASTED	<input type="checkbox"/> CLEAN BARE METAL
SURFACE TEMPERATURE	<input type="checkbox"/> < -4°C/ 20°F	<input type="checkbox"/> -4°C/ 20°F TO 10°C/50°F	<input checked="" type="checkbox"/> 10°C/50°F TO 52°C/125°F	<input type="checkbox"/> > 52°C/125°F	

RESULTS- ☒ METRIC ☐ IMPERIAL

1	ENGINE Mount # 73732	✓	
1	- CROSS TUBE W.O. 75831	✓	
1	- CROSS TUBE W.O. 75830	✓	
1	ENGINE Mount # 73731	✓	
1	- CROSS TUBE W.O. 77109	✓	REWORK
1	- CROSS TUBE W.O. 77108	✓	
1	- CROSS TUBE W.O. 74928	✓	REWORK
1	- CROSS TUBE W.O. 77290	✓	REWORK
1	- CROSS TUBE W.O. 77291	✓	
1	- CROSS TUBE W.O. 74930	✓	
1	- CROSS TUBE W.O. 74924	✓	TARE IN DRILL HOLE.
1	- CROSS TUBE W.O. 74667	✓	NOTE & REWORK

Scope of Services

The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

SIGNATURES

CLIENT REPRESENTATIVE	Bar Titley	SIGNATURE	DTR # E90917
TECHNICIAN (SIGNATURE):	Mike Ihusan	NAME	INITIALS
NAME (PRINT):	1 st TECHNICIAN	2 nd TECHNICIAN	
CGSB LEVEL	II	SNT LEVEL	II
CGSB REG. No	6606	CGSB REG. No	

HELITRADES INC.

P.O. Box 162, 18 Terry Fox Drive
Vankleek Hill, Ontario
K0B 1R0, Canada
TEL (613) 678-3027 FAX (613) 678-2776
Email: helitrad@hawk.igs.net
GST# R102320439

ESTIMATE:

H17995

CONTRACT#:

ESTIMATE DATE:

19-Dec-2011

CUSTOMER P.O.:

15659

CUSTOMER I.D.:

DART AEROSPACE

DATE ITEM RECEIVED:

13-Dec-2011

SOLD TO: DART AEROSPACE
1270 ABERDEEN STREET

SHIP TO:

HAWKESBURY K6A 1K7
LINDA/MELANIE

Part Number: D350-748-101
Serial Number: UNKNOWN
Description: CROSSTUBE
Component ID: 206-13

Assy. TTSN: UNKNOWN
Assy. TTSO: UNKNOWN
Removed From: UNKNOWN

GENERAL CONDITION AS RECEIVED: GOOD.

UNIT RECEIVED FOR: Overhaul: _____ Repair: X Test: _____ Warranty: _____ Insp: _____
WARRANTY ACCEPTED: Yes: _____ No: _____ N/A: X
REPORTED FAILURE: TOUCH UP CADMIUM PLATING
WAS REPORTED FAILURE CONFIRMED: YES
REMARKS:

COST BREAKDOWN

LABOUR REPAIR 2 HRS @ \$85/HR \$170.00
ESTIMATE SUBTOTAL \$170.00 + applicable taxes

Payment Terms: Net 30 days Estimate is subject to variances in exchange rates. Items are F.O.B. Vankleek Hill, ON.

Exchange Rate: _____ Turn Around Time: 1-2 DAYS

If it is decided not to have this item repaired/overhauled an evaluation charge of \$ 85.00 will apply.

Please indicate your response and return this form to fax number 613-678-2776

Proceed as quoted: _____ Return as is: _____ Scrap at Helitrades facility: _____

Authorization Signature and Date

NO FURTHER WORK WILL BE PERFORMED UNTIL WE RECEIVE YOUR AUTHORIZATION TO PROCEED.
THIS ESTIMATE IS BASED ON A PRELIMINARY INSPECTION OF YOUR ITEM. WE RESERVE THE RIGHT
TO SUBMIT AN ADJUSTED QUOTATION IF ADDITIONAL WORK IS FOUND TO BE REQUIRED.

Work Order ID 74667

Wednesday, October 05, 2011 8:25:14 AM



U/R

Page 1

Item ID: D350-748-101

Accept



Setup Start



Revision ID: U/R

Stop



Item Name: Crosstube Installation, High Fwd



Start Date: 10/5/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 10/21/2011 Req'd Qty: 1.00

Customer:

Reference:

Run Start



Approvals:

Process Plan: M.L.J.

Date: 11/10/04 Tooling:

Date:

Stop



QC:

Date:

SPC (Y/N):

Date:

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

Draw Nbr

Revision Nbr

D350-748-141

F U/R? OK 11/10/05

M.L.J. 11/12/21

100

0.00



DOCUMENT CONTROL

DC

Memo

0.00

Document Control

Photocopy bluefile & type labels per PPPD350-748-101

CHG002

110

0.00



BENDING MACHINE - CROSSTUBES

CNC Bend 1

Memo

0.00

CNC Delta 100 Bender

Bend tube as per Dwg D350-748-141 using CNC bender program D350F and Folio FT

DP

11-11-9

120

0.00



QC15- Crosstube Dimensional Check

QC

Memo

0.00

Quality Control

Sulino

He

REFERENCE ONLY

5.0 PARTS LIST

Qty -101	Qty -201	Part Number	Description
X		D350-748-101	CROSSTUBE INSTALLATION, AS 350/355 HIGH FWD
	X	D350-748-201	CROSSTUBE INSTALLATION, AS 350/355 HIGH AFT
1		D350-748-141	CROSSTUBE ASSEMBLY, AS 350/355 HIGH FWD
	1	D350-748-241	CROSSTUBE ASSEMBLY, AS 350/355 HIGH AFT
*2	*2	D3502-1	SUPPORT
*2	*2	D2856-400-710	ABRASION STRIP
*1	*1	AELS-1032-225	INSERT
*2	*2	MS21920-20	CLAMP
*1	*1	MS27039-1-10	SCREW
*1	*1	AN960JD10	WASHER
4	4	D3500-1	SADDLE
16	16	D3501-1	BUSHING
16	16	AN4-6A	BOLT
8	8	AN4-41A	BOLT
4	4	AN5-32A	BOLT
32	32	AN960JD416	WASHER
8	8	AN960JD516	WASHER
24	24	MS21042L4	NUT (OR MS21042-4)
4	4	MS21042L5	NUT (OR MS21042-5)

* REFERENCE ONLY. PARTS ARE INCLUDED IN D350-748-141/241 ASSEMBLIES ABOVE

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Revision: **B**

Date: 07.06.15